

REVIEW - Exponential Functions

A. GROWTH OR DECAY

Classify the following as growth or decay.

1) $y = -2(3)^x$
G

2) $f(x) = 7\left(\frac{1}{3}\right)^x$
D

3) $f(x) = 0.6(2)^x$
G

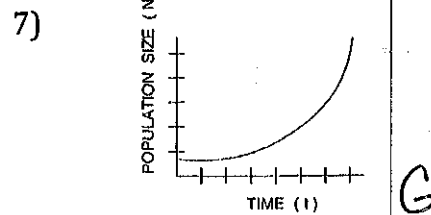
4) $y = 100(0.7)^x$
D

5) $f(x) = 6(1.2)^x$
G

6)

x	y
0	10
1	5
2	5/2

D



B. PERCENT GROWTH AND DECAY - Word Problems

1) An account starts with \$250 and appreciates 5% each year.

a. Growth or decay? growth

b. Write an equation to model the situation. $y = 250(1.05)^x$

c. How much money will be in the account after 6 years?

$$250(1.05)^6 = \$335.02$$

2) A rabbit population begins ^{decay} dying off at a rate of 8% each year. There were 500 rabbits initially. How many will there be at the end of 2 years?

$$b = 100\% - 8\% = 92\% \Rightarrow 0.92$$

$$500(0.92)^2 \approx 423 \text{ rabbits}$$

3) A mutual fund with \$8,500 ^{decay} depreciates 14% every 2 years. Write an equation, $m(y)$, to model the amount of money left in the account after y years.

$$b = 100\% - 14\% = 86\% \Rightarrow 0.86$$

$$M(y) = 8,500(0.86)^{\frac{y}{2}}$$

C. EXPONENT RULES

Simplify

1) $f^8 \cdot f^2 \cdot f$
 f^{11}

2) $\frac{3y^5}{y^2}$
 $3y^3$

3) $(5h^4)^2$
 $25h^8$

4) Rewrite r^{-5}
 $\frac{1}{r^5}$

5) b^0
1

6) $3x^2 + 5x$
 $3x^2 + 5x$
not like terms!

7) $2x^3 + x^3$
 $3x^3$

ONLY CHANGE
EXPONENTS
IF YOU MULTIPLY!

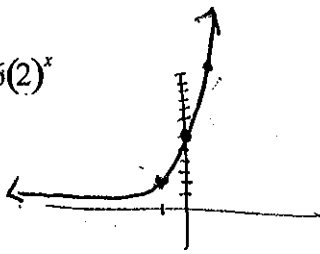
D. GRAPHING EXPONENTIAL FUNCTIONS

Graph the following. Your graph must contain at least 3 specific points.

(0, a)

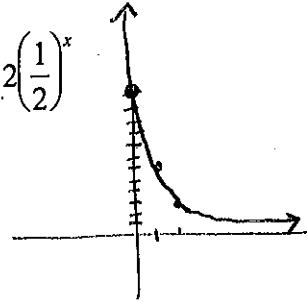
1) $y = 6(2)^x$

x	y
-1	3
0	6
1	12



2) $f(x) = 12\left(\frac{1}{2}\right)^x$

x	y
-1	24
0	12
1	6
2	3



E. SOLVING EXPONENTIAL EQUATIONS

1) $4^{7x+2} = 16 = 4^2$

$$7x + 2 = 2$$

$$-2 \quad -2$$

$$7x = 0$$

$$x = 0$$

2) $3^{-x+2} = 1 = 3^0$

$$-x + 2 = 0$$

$$x = 2$$

3) $9^{x+2} = 9^{3x+1}$

$$x + 2 = 3x + 1$$

$$-x \quad -x$$

$$2 = 2x + 1$$

$$-1 \quad -1$$

$$\frac{1}{2} = \frac{2x}{2} \quad x = \frac{1}{2}$$

4) $5^{6x} = \frac{1}{125} = 5^{-3}$

$$\frac{6x}{6} = \frac{-3}{6} \quad x = -\frac{1}{2}$$

5) $4^{x-1} = 8^{3x}$

$$(2^2)^{x-1} = (2^3)^{3x}$$

$$2^{2x-2} = 2^{9x}$$

$$2x - 2 = 9x$$

$$-2x \quad -2x$$

$$-2 = 7x$$

$$x = -\frac{2}{7}$$

F. USING GRAPHING CALC

Use your calculator to create a table of values for each function.

1) $f(x) = 4^x + 1$

x	-2	-1	0	1
f(x)	1.0625	1.25	2	5

2) $f(x) = 2^{-x} - 3$

x	-2	-1	0	1
f(x)	1	-1	-2	-2.5

G. MODELING - Word Problems

1) When Violet Beauregard turns into a blueberry, she doubles in size every 9 minutes. Normally, Violet is 5 feet tall.

A. Does this situation represent growth or decay? *growth*

B. Write an equation, $h(m)$, to represent Violet's height, h , after m minutes. $h(m) = 5(2)^{\frac{m}{9}}$

C. If it takes Violet 18 minutes to get to the juicer, how big will she be?

$$h(18) = 5(2)^{\frac{18}{9}} = 5(2)^2 = 20 \text{ feet tall!}$$

2) Every hour, half of my 1,000 initial bacteria die off. How many bacteria will be left after 6 hours?

$$1,000 \left(\frac{1}{2}\right)^6 = 15.625$$

\Rightarrow about 16 bacteria

H. WRITING EQUATIONS FROM A TABLE

Write the exponential equation to fit each table:

1)

x	y
-1	80
0	20
1	5
2	5/4

$$y = 20 \left(\frac{1}{4}\right)^x$$

2)

x	y
-1	5
0	10
1	20
2	40

$$y = 10(2)^x$$

I. WRITING EQUATION GIVEN 2 POINTS

Write the exponential equation to fit each pair of points.

1) Through (0,4) and (1,24)

$$y = 4(6)^x$$

2) Through (0,8) and (2,2)

0	8
2	2

$$a = 8$$

$$2 = 8 \cdot b^2$$

$$\sqrt{\frac{1}{4}} = \sqrt{b^2} \quad b = \frac{1}{2}$$

$$y = 8\left(\frac{1}{2}\right)^x$$

3) Through (1,7) and (2,21)

0	7/3
1	7
2	21

$$7 = a \cdot 3^1$$

$$\frac{7}{3} = \frac{3a}{3}$$

$$a = 7/3$$

$$y = \frac{7}{3}(3)^x$$

4) Through (0,6) and (4,62)

$$a = 6 \quad x = 4 \quad y = 62$$

$$\frac{62}{6} = \frac{6 \cdot b^4}{6}$$

$$\sqrt[4]{10.3} = \sqrt[4]{b^4}$$

$$b = 1.793$$

$$y = 6(1.793)^x$$

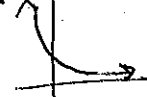
J. GRAPH SHAPE

Sketch the shape for the following graphs

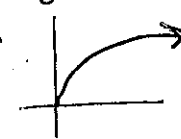
1) Exponential growth



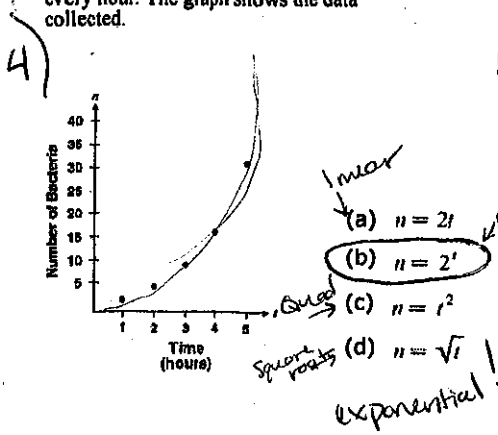
2) Exponential decay



3) Logarithmic



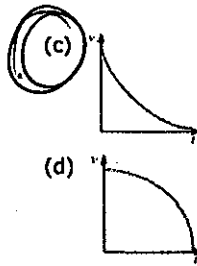
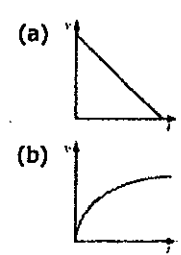
A scientist used a microscope to count the number of bacterial cells in a Petri dish every hour. The graph shows the data collected.



Which function most accurately represents this data, where n is the number of bacteria and t is the time elapsed, in hours?

5)

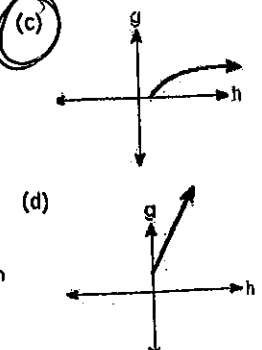
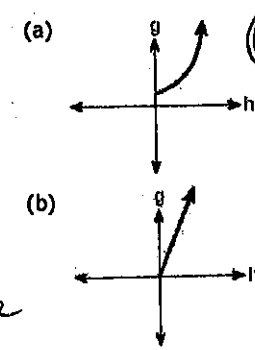
A machine tool loses 15% of its value each year. Which graph best represents a 15% annual depreciation in value, v , over time, t , of an object?



6)

If g represents cell growth and h represents time, in hours, which graph best represents the growth pattern of the cells of this organism?

The cells of a particular organism increase logarithmically.



exp. decay shape